UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

11/17/04

Ref: 8EPR-SR

MEMORANDUM

SUBJECT: Regional Responses to comments forwarded by the National Remedy Review Board regarding Kennecott South OU2 Remedy

FROM: Dr. Eva J. Hoffman
Lead Remedial Project Manager, Kennecott Sites

THRU: Dale Vodehnal, Director
EPA Region 8, Superfund Remedial Program

TO: Mr. Bruce K. Means, Chairman
National Remedy Review Board

This memorandum will document the regional responses to issues raised concerning the remedy EPA proposed for the Kennecott South Zone Ground Water (OU2) at the meeting of the National Remedy Review Board (NRRB) in Salt Lake City on March 14, 2000. After the NRRB met on this subject, EPA Region 8 and UDEQ signed a Record of Decision (December 13, 2000), issued an Explanation of Significant Differences in 2002, and approved the Remedial Design in 2002. The reverse osmosis treatment plant construction for Zone A started in 2002 and is due to be completed at the end of 2005. Negotiations for the Consent Decree covering the design, construction work, and operations and maintenance began last week. The Proposed Work Plan for design and construction of the matters covered by the Natural Resources Damage (NRD) Claim settlement was submitted to the State Trustee, who sent it to public comment. It was later revised and then approved by the State Trustee on August 31, 2004.

From the National Remedy Review Board recommendations: *"In conducting its review, the board notes that the proposal represents a combined CERCLA 106/Natural Resource Damages (NRD) action. The board also acknowledges that the need for drinking water in the Salt Lake area is addressed by an NRD settlement establishing specific requirements. These requirements provide incentives for Kennecott to focus first on providing potable water. The board ask that the comments below be placed in this site specific and regulatory context."*

In order to facilitate close cooperation between the two authorities, the Technical Review Committee formed for the CERCLA response expanded its area of interest to include the state

trustee settlement issues as well. The two projects have dovetailed nicely. The CERCLA action is primarily designed to withdraw the acid plume waters from the aquifer before they can spread further down valley and to contain the sulfate plume (using barrier wells) from migrating farther downgradient. How exactly the water is treated and then used was not the primary focus. The NRD settlement, on the other hand, was focused on the use of the waters for drinking. The treated water would augment the potable water supplies in the Jordan River Valley. The towns most affected by the plumes would receive their water (which included this new water source) at a discount. Scientists and engineers have predicted that both projects can be done simultaneously. Pilot studies have proven this to be the case.

From the NRRB memo: *"One of the region's stated goals for the proposed ground water cleanup action is to restore the aquifer to beneficial use. However, the proposed action does not clearly describe how long it will take to do so. The board recommends that the region include this information in the decision documents for this site, both with respect to the acid plume and the sulfate plume (and include information on the potential for contaminant re-dissolution)."*

The Record of Decision did include the results of the modeling and concluded that the acid plume and its companion sulfate plume could take 50 years or longer to return to beneficial use status. The problem of re-dissolution of solid phase contaminants back into the water after the removal of the original plume was also mentioned as well. As part of the RI/FS studies, several column experiments were conducted to determine how many pore volumes of clean water it would take to flush out the contaminants in the solid phase.

Acid withdrawals and sulfate barrier wells have been operational for several years now. (The water is used now in Kennecott's process circuit.) The impact of these withdrawals have already had a measurable impact on the isoconcentration lines for the plume. A recent comparison showing the shrinkage was shown to the Technical Review Committee in June, 2004 (See Figure 1). The new modeling results were also shown (See Figure 2).

From the NRRB memo: *"The board could not fully evaluate the cost-effectiveness of the proposed pump and treat system with respect to potential restoration time frames. To allow for such an assessment, the board recommends that the region further evaluate the following:*

- *Alternate (e.g. increased) pumping rates, well location, or other system design features that would accelerate contaminated groundwater withdrawal, focusing on the acid plume in particular.*
- *The use of ground water reinjection to enhance cleanup and shorten overall restoration time frame.*

Since these recommendations were made, the pumping rates for the acid plume were increased well beyond that required by the NRD settlement. The modeling also suggests that the wells will have to be moved several times as the pumping proceeds. Reinjection remains a possibility (and was included as an option to contain the plume) but is very unpopular. The modeling indicates few, if any, benefits in overall plume remediation rate.

From the NRRB memo: *"The cost-effectiveness of the preferred treatment processes*

(nano-filtration and reverse osmosis) depends in part on disposal of the concentrate with the tailings. An alternate approach will be needed following mine closure. The board recommends that Kennecott continue to look at emerging technologies for cost-effective treatment over the long term. With this in mind, the region should consider including a technology re-evaluation provision in the record of decision or the CERCLA consent decree."

The region agrees and the ROD did include a statement that another form of treatment would be required after mine closure. The treatment technology required was not specified in the ROD, allowing the engineers to chose that at the time of mine closure. At the present time, there are huge lime treatment facilities already in place at the Copperton Concentrator. These can be fitted with different plumbing and can be used nearly immediately until a decision about the final remedial technology can be made. The lime treatment technology is the treatment used for acid mine drainage in most mining operations today, a proven technology. But it does have its side-effects including production of large volumes of lime wastes. Because of the proximity of these mining facilities to urban and suburban settlements, this remedy is not very popular with the local citizenry.

Nanofiltration of acidic waters was later dropped in the remedial design process (and documented in an Explanation of Significant Differences) because it produced very little water and the concentrate which was still acidic was treated in the tailings line (neutralization). Now the acid plume waters are not pretreated until they are treated in the tailings line. This saved the cost of at least one treatment plant and operation.

From the NRRB: *"The cost summaries for the preferred alternatives include $16 million for institutional controls (ICs). The information presented to the board notes that these controls include the purchase of water rights and land. The cost of these ICs appear high, especially considering that $2.4 million is also to be spent on preventing exposure (e.g., alternate water supplies). The board recommends that the region clarify how ICs will be implemented to ensure protectiveness, and that it provide a more detailed breakdown of the $16 million IC costs.*

The future costs of the institutional controls can still not be estimated with any certainty. Future water drops are anticipated and formerly useful wells could go dry. Given that the size of the plume is 72 square miles, the $16 million potential amounts to only about $350 per acre. That is a rather modest amount. The seemingly high total cost is actually a problem of scaling up a modest cost to mega-site size.

Thank you for the opportunity to update the issues identified by the NRRB.

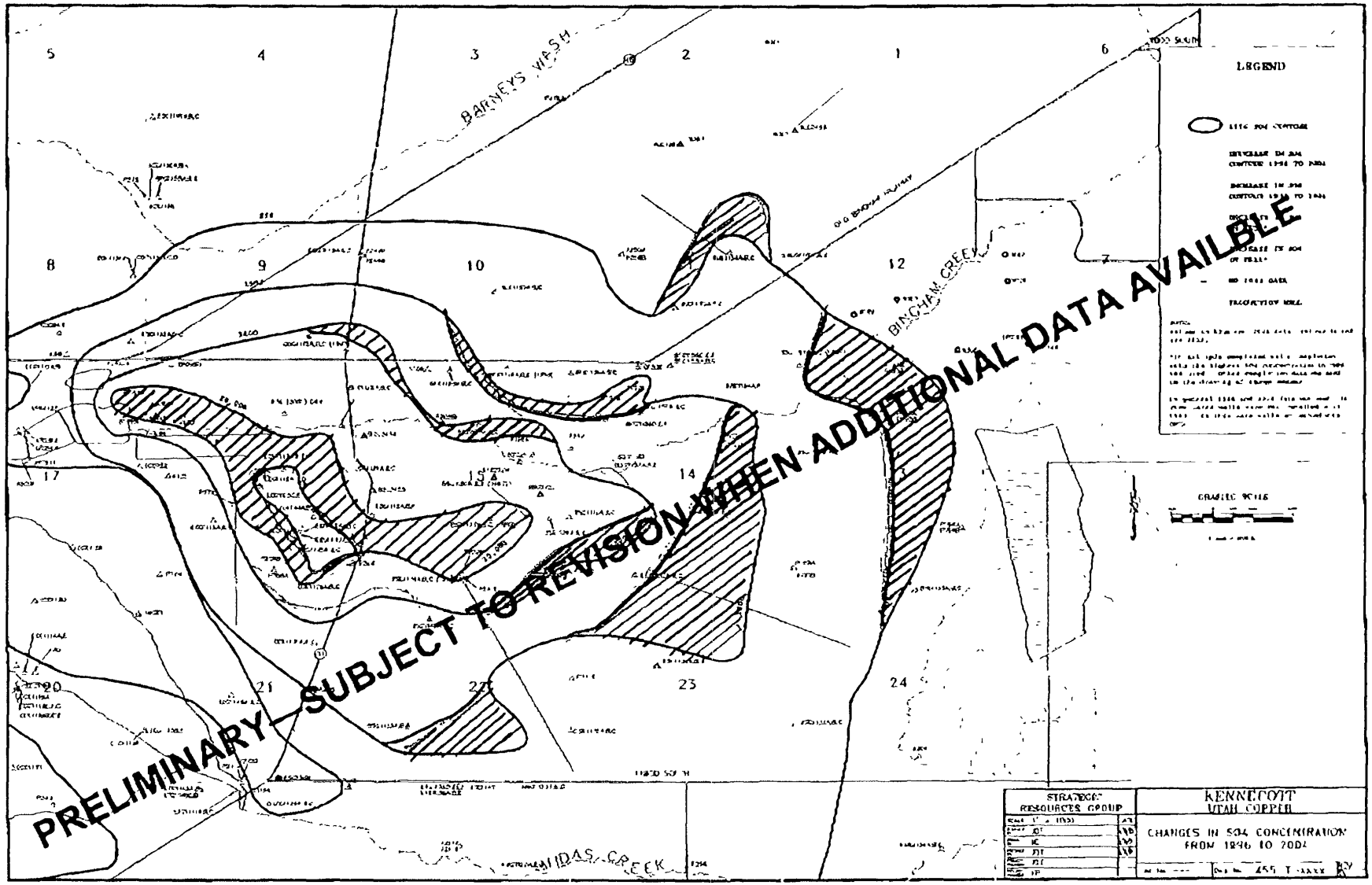
PRELIMINARY - SUBJECT TO REVISION WHEN ADDITIONAL DATA AVAILBLE
BARNEYS WASH
BINGHAM CREEK
MIDAS CREEK
LEGEND
STRATEGIC RESOURCES GROUP
KENNECOTT
UTAH COPPER
CHANGES IN SO4 CONCENTRATION FROM 1996 TO 2004

Fig 1

Model Predicted Sulfate Concentrations

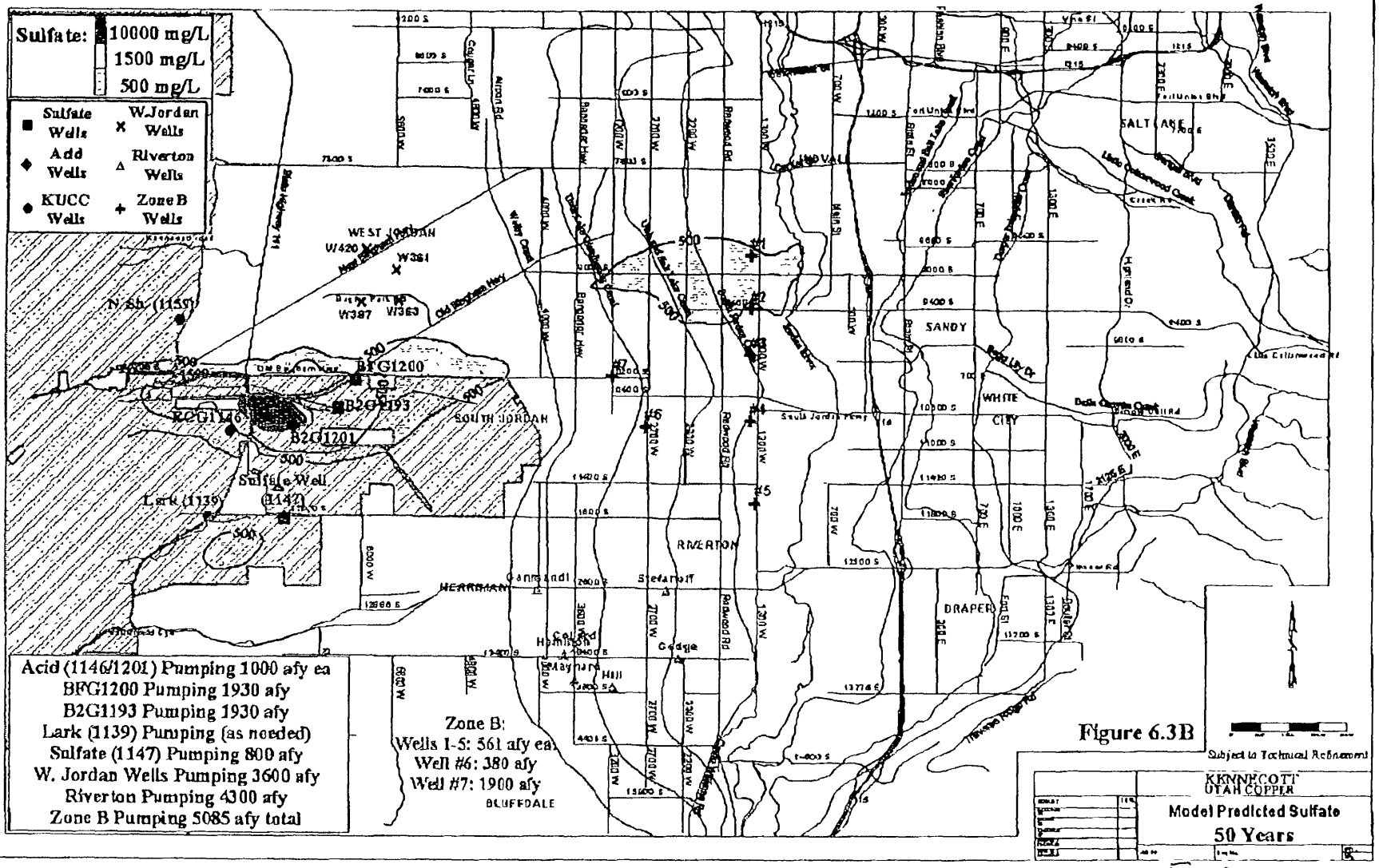

Figure 6.3B

Fig 2